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User Interface for Interactive Television Systems

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1 **TECHNICAL FIELD**

2 This invention relates to an interactive television system that allows a
3 viewer to interact with the broadcaster or developer of a television program.
4

5 **BACKGROUND**

6 Until recently, television viewers received and viewed television broadcasts
7 without any opportunity to interact with the broadcaster of the television program
8 or the organization associated with the television program content. Newly
9 developed systems, typically referred to as "interactive television systems",
10 provide bi-directional communications between a viewer of a television program
11 and, for example, the broadcaster or developer of the television program. Thus,
12 interactive television systems allow a viewer to interact with the broadcaster or
13 developer of the television program.

14 In an interactive television system, the television viewer interacts with the
15 broadcaster by participating in polls, playing along with game shows, or
16 requesting information from advertisers. Additionally, interactive television users
17 can access news headlines, retrieve sports statistics, or chat with other sports fans
18 or other viewers that share common interests. This interaction enhances the
19 viewer's television viewing experience and allows the viewer to feel that they are
20 actively participating in the television program rather than merely viewing the
21 program.

22 A typical interactive television system uses a set-top box, or similar device,
23 that receives television broadcasts and includes a modem that connects to a
24 telephone line to allow transmission of data from the set-top box to the television
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1 broadcast source.

2 One type of interactive television system generates an indicator on the
3 television screen which informs the viewer that an interactive mode is available
4 for the program being displayed on the current channel. Using this system, the
5 interactive mode cannot be activated unless the indicator is displayed on the
6 television screen. If the viewer does not activate the interactive mode (for
7 example, by pressing the appropriate button on a remote control device) within a
8 particular time period, such as fifteen seconds, then the indicator is removed from
9 the television screen. If the viewer later decides that they want to activate the
10 interactive mode, the viewer is required to change to another channel and change
11 back to the original channel to re-display the interactive mode indicator. Once the
12 indicator is displayed, the interactive mode can be activated by the viewer.

13 This type of interactive television system also requires a viewer to re-
14 activate an interactive mode each time the viewer changes channels. For example,
15 if the viewer has activated the interactive mode for a particular television channel,
16 changes channels, and returns to the original channel (which was previously in
17 interactive mode), the viewer is required to re-activate the interactive mode for
18 that channel. Thus, the system does not maintain an interactive mode status for
19 the television channels. This repeated activation of the interactive mode is tedious
20 for viewers that change channels frequently.

21 Disclosed herein is an interactive television system that addresses the
22 shortcomings discussed above by allowing the user to activate an interactive mode
23 regardless of whether a particular indicator is displayed on the television screen.
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1 program is displayed. The device displays a first indicator if the television
2 program supports an interactive television mode. A second indicator is displayed
3 if the television program supports an online television mode. The interactive
4 television mode is activated if a viewer selects the first indicator and the online
5 television mode is activated if the viewer selects the second indicator.

6 Particular embodiments of the interactive television device use multiple
7 tuning devices to maintain the interactive television status or online television
8 status for each channel.

10 **BRIEF DESCRIPTION OF THE DRAWINGS**

11 Fig. 1 illustrates an exemplary network environment in which an interactive
12 television device transmits and receives data across the Internet and receives
13 television signals from a television broadcast source.

14 Fig. 2 is a block diagram of an interactive television device capable of
15 receiving television signals and network data and generating video signals for
16 display on a display device.

17 Figs. 3 – 6 illustrate various television screen images with different
18 interactive television controls and status displays.

19 Fig. 7 illustrates a television screen image showing an online mode
20 indicator and an option to switch to an associated web page.

21 Fig. 8 illustrates a television screen image showing both an interactive
22 mode indicator and an online mode indicator.

23 Fig. 9 is a flow diagram illustrating a procedure for displaying indicators
24 that an interactive mode and/or an online mode is available.
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1 Fig. 10 is a flow diagram illustrating a procedure for handling a request to
2 enter an interactive mode for the current television program.

3 Fig. 11 illustrates a channel table that indicates the interactive mode and
4 online mode status of one or more television channels.

5 Fig. 12 is a flow diagram illustrating a procedure for establishing the proper
6 interactive mode when changing television channels.

7 8 **DETAILED DESCRIPTION**

9 The interactive television system described herein allows the user to
10 activate an interactive television mode regardless of whether a particular indicator
11 is displayed on the television screen. An interactive television mode allows the
12 television viewer to interact with, for example, the broadcaster or developer of the
13 television program. The interactive television system maintains the interactive
14 mode associated with each channel on a channel-by-channel basis. The interactive
15 television system also provides two separate indicators, one indicating that an
16 interactive television mode is available, and another indicating that an online
17 television mode is available. An online television mode allows the viewer to
18 access one or more web pages associated with the television program.

19 Various examples and embodiments are described herein with reference to
20 television programs. However, the systems and procedures described herein can
21 be used with any type of video segment or video program, and are not limited to
22 television programs.

23 Fig. 1 illustrates an exemplary network environment 100 in which an
24 interactive television device 108 transmits and receives data across the Internet
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1 110 and receives television signals from a television broadcast source 112. A
2 client 102, servers 104 and 106, and the interactive television device 108 are
3 coupled to one another through the Internet 110. Interactive television device 108
4 is capable of receiving various types of data from one or more devices coupled to
5 the Internet 110. Interactive television device 108 is also coupled to the television
6 broadcast source 112, which broadcasts television signals via a communication
7 link 114. Interactive television device 108 may receive television signals from
8 source 112 via cable, satellite, microwave, computer network, terrestrial (over the
9 air) broadcast, or any other communication medium. Although not shown in Fig.
10 1, television broadcast source 112 may have an associated server or other device
11 coupled to the Internet 110, which allows the source 112 to broadcast television
12 signals via one medium (e.g., cable) and transmit other data related to the
13 television broadcast via the Internet 110. Alternatively, television broadcast
14 source 112 may transmit television signals as well as other data related to the
15 television signals via the Internet 110.

16 Interactive television device 108 is also coupled to a display device 116 via
17 a video communication link 120. Video communication link 120 may be a radio
18 frequency (RF), s-video, composite video, component video, or other video link.
19 Display device 116 may be any type of video display such as a television, a
20 monitor, a flat panel display or a video projection system. The interactive
21 television device 108 can be, for example, a set-top box, a game console, or a
22 personal computer. Alternatively, interactive television device 108 may be
23 integrated into another device such as a display device, a cable television receiver
24 box or a satellite receiver box.
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1 When operating in an interactive mode, interactive television device 108
2 typically receives television signals from source 112 via link 114. Interactive
3 television device 108 communicates information to source 112 via the Internet
4 110. Thus, multiple communication links are utilized to establish an interactive
5 session between the user of interactive television device 108 (i.e., the viewer of
6 display device 116) and the television broadcast source 112. The television signal
7 received on link 114 typically includes a video program, such as a television
8 program. The television signal may also include one or more identifiers that
9 indicate whether the current television program broadcast supports an interactive
10 mode and/or an online mode.

11 Fig. 2 is a block diagram of interactive television device 108, which is
12 capable of receiving television signals and network data and generating video
13 signals for display on a display device. A television interface 200 receives a
14 broadcast television signal from broadcast source 112 on communication link 114.
15 A video tuner 202 tunes the television signal received by interface 200. A data
16 interface 206 provides a bi-directional data interface between a data
17 communication link 208 and interactive television device 108. Data
18 communication link 208 may use any type of communication medium and any
19 communication protocol. In a particular embodiment of the invention, data
20 communication link 208 is a telephone line that provides a data connection to the
21 Internet or another data communication network, and data interface 206 includes a
22 modem or other bi-directional data communication device. A data tuner 204 tunes
23 (i.e., retrieves) data received across communication link 208. Alternatively, data
24 tuner 204 may tune (or decode) data contained in a television signal received on a
25 communication link, such as link 114.

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1 Interactive television device 108 includes one or more processors 210, a
2 random access memory (RAM) 212, a read-only memory (ROM) 214, and a mass
3 storage device 216. Processor 210 is capable of implementing the various
4 procedures and operations discussed herein. RAM 212 and mass storage device
5 216 provide for the storage of data, instructions, and other information used by
6 processor 210 during the normal operation of interactive television device 108.
7 ROM 214 stores various parameters and basic operating instructions used, for
8 example, by processor 210. An audio/video interface 218 communicates audio
9 and video signals across communication link 120 to a display device (such as
10 display device 116). Although not shown in Fig. 2, interactive television device
11 108 may also include a remote control interface that allows a television viewer to
12 control the functions of the interactive television device using a handheld remote
13 control device.

14 Generally, the processor 210 of interactive television device 108 is
15 programmed by means of instructions stored at different times in various
16 computer-readable storage media of device 108, such as RAM 212, ROM 214, and
17 mass storage 216. The interactive television system described herein includes
18 various types of computer-readable storage media when such media contains
19 instructions or programs for implementing the steps described herein in
20 conjunction with a processor. The interactive television system also includes the
21 device 108 itself when programmed according to the methods and techniques
22 described herein. Alternatively, the interactive television system can be
23 implemented in hardware or a combination of hardware, software, and/or
24 firmware. For example, one or more application specific integrated circuits
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1 (ASICs) could be programmed to carry out the methods and techniques described
2 herein.

3 Figs. 3 – 6 illustrate various television screen images with different
4 interactive television controls and status displays. Specifically, Fig. 3 illustrates a
5 television screen image for a television program that does not have an associated
6 interactive mode or online mode. The television display communicates
7 information to the viewer about the current program. A program title 250 is
8 displayed along with the channel (“124”) and an abbreviated channel name 252
9 (i.e., “TRVL” for a travel-related channel). Three buttons are displayed along the
10 bottom of the television screen shown in Fig. 3. A “TV Favorites” button 254
11 allows the viewer to display a list of favorite television stations, a “Program Info”
12 button 256 allows the viewer to display information about the current program,
13 and a “Go Interactive” button 258 (which is grayed-out, indicating that the feature
14 is not available) would allow a viewer to activate an interactive mode.

15 Fig. 4 illustrates another television screen image for a television program
16 that has an associated interactive mode. The availability of an interactive mode is
17 indicated by an icon 262 and a “Go Interactive” button 264 that allows the viewer
18 to activate an interactive mode. The interactive mode associated with the screen
19 of Fig. 4 is identified by a title 260, “Travel Journal Interactive.” The viewer
20 activates the interactive mode using a selection mechanism, for example, by
21 pressing an appropriate interactive mode button on a remote control device or a
22 set-top box. Alternatively, the interactive mode is activated by highlighting the
23 “Go Interactive” button 264 (for example, using arrow keys on a remote control
24 device or a set-top box) and activating the highlighted button 264. If the viewer
25 does not activate the online mode within a particular period of time (such as

1 fifteen seconds), the title 260, icon 262, and button 264 are removed from the
2 television screen. After button 264 is removed from the television screen, the
3 viewer can still activate an interactive mode by pressing, for example, an
4 appropriate button on a remote control or a set-top box. Thus, the user is able to
5 activate an interactive mode even though the indicators that an interactive mode is
6 available are no longer displayed on the television screen.

7 Fig. 5 illustrates a television screen image that appears after activating the
8 interactive mode through the screen shown in Fig. 4. A "Go Interactive" button
9 264 (Fig. 4) is replaced with a "Stop" button 270, which allows the viewer to stop
10 the activation of the interactive mode. A bar display 272 indicates that the
11 interactive mode is being activated and shows the progress of the activation
12 procedure. When the interactive mode is fully activated, bar display 272 is
13 removed from the television screen. If the interactive mode can be established
14 quickly, then the bar display 272 is not typically displayed. In this example, the
15 interactive television device is a WebTV[®] Internet terminal manufactured by
16 WebTV Networks, Inc., a subsidiary of Microsoft Corporation.

17 Fig. 6 illustrates a television screen image that appears after the interactive
18 mode has been activated. The screen shown in Fig. 6 includes "TV Favorites" and
19 "Program Info" buttons 254 and 256 similar to those illustrated in Fig. 3. A "Stop
20 Interactive" button 280 allows the viewer to exit the interactive mode and return to
21 a non-interactive television viewing mode. An indicator 282 informs the viewer
22 that an interactive viewing mode is active. In the example of Fig. 6, an interactive
23 window 284 is opened to the right of a program window 286. Interactive window
24 284 identifies a portion of the television screen that is used for interactive
25 purposes. Interactive window 284 allows the viewer to interact with, for example,

the television broadcast source. Examples of this interaction include answering a question or a poll, requesting information about a program or advertiser, or purchasing a product or service. In Fig. 6, the viewer is asked to select their favorite vacation destination. Program window 286 displays the current television program, which is reduced in size to allow space for the interactive window 284. By displaying both windows 284 and 286 simultaneously, the viewer is able to watch both the television program and the interactive questions or information displayed in window 284. Although a particular arrangement and sizing of windows is illustrated in Fig. 6, alternate embodiments may arrange and adjust the size of the displayed windows in any manner.

Fig. 7 illustrates a television screen image showing an online mode indicator and an option to switch to an associated web page. The availability of an online mode is indicated by an icon 292 and a “Go to Web Page” button 294 that allows the viewer to activate an online mode. The “w” used in icon 292 represents that a web page (online mode) is available. The online mode associated with the screen of Fig. 7 is identified by a title 290, “Travel Journal Online.” The viewer activates the online mode, for example, by pressing an appropriate button on a remote control or a set-top box. Activation of the online mode connects the viewer’s interactive television device to a particular web page associated with the television program or an advertiser. A bar display (similar to bar display 272 in Fig. 5) is displayed while the interactive television device establishes a connection with the appropriate web page. Once a connection is established with the web page, the screen image may be divided into two or more display windows (for example, one window displaying the current program and the other window displaying the associated web page). Alternatively, the interactive television

1 device may stop displaying the current program while in the online mode. This
2 allows the entire television screen to be used for displaying the web page. In this
3 example, the current program is re-displayed when the viewer finishes viewing the
4 web page and activates a "Stop" or "Stop Online" function.

5 If the viewer does not activate the online mode within a particular period of
6 time, the title 290, icon 292, and button 294 are removed from the television
7 screen. After button 294 is removed from the television screen, the viewer can
8 still activate the online mode by pressing an appropriate button on a remote
9 control or a set-top box. Thus, the user is able to activate an online mode even
10 though the indicators that an online mode is available are no longer displayed on
11 the television screen.

12 Fig. 8 illustrates a television screen image showing both an interactive
13 mode indicator 296 and an online mode indicator 298. These small indicators 296
14 and 298 are less distracting to the viewer than displaying larger indicators, such as
15 button 294 and title 290, shown in Fig. 7. The two indicators 296 and 298 notify
16 the viewer that the current television program has both an interactive mode and an
17 online mode. Typically, the viewer does not activate both the interactive mode and
18 the online mode simultaneously. The viewer is able to activate either the
19 interactive mode or the online mode by pressing an appropriate button on a remote
20 control device or on a set-top box. For example, the remote control device or the
21 set-top box may have buttons with a design that matches the design of indicator
22 296 and indicator 298. Activating one of these buttons activates the corresponding
23 mode. Alternatively, the user may ignore both icons 296 and 298, and continue
24 viewing the television program in a non-interactive, non-online mode. The two
25 indicators 296 and 298 are removed from the television screen after a particular

1 time period, such as fifteen seconds. Although the indicators 296 and 298 are
2 removed from the television screen, the viewer remains able to activate either the
3 interactive mode or the online mode by selecting appropriate button on the remote
4 control device or the set-top box.

5 Fig. 9 is a flow diagram illustrating a procedure for displaying indicators
6 that an interactive mode and/or an online mode is available. A television
7 broadcast source (such as source 112 in Fig. 1) broadcasts a television signal
8 containing a television program and encoded information regarding available
9 interactive modes and/or online modes (step 300). An interactive television device
10 (such as device 108 in Fig. 1) receives the broadcast television signal and displays
11 the television program on a display device (step 302). The interactive television
12 device decodes the information regarding available interactive and/or online
13 modes (step 304). Additionally, the interactive television device decodes
14 information regarding a web site or network address for accessing the interactive
15 data. The procedure then determines whether an interactive mode is available
16 (step 306). If an interactive mode is not available, then the procedure branches to
17 a step that determines whether an online mode is available. If an interactive mode
18 is available, the interactive television device displays an indicator that an
19 interactive mode is available for the current television program (step 308). This
20 indicator may be any one or more of the title 260, the icon 262, or the "Go
21 Interactive" button 264 shown in Fig. 4.

22 The procedure next determines whether an online mode is available (step
23 310). If an online mode is not available, then the procedure branches to step 314
24 without displaying an online mode indicator. If an online mode is available, the
25 interactive television device displays an indicator that an online mode is available

1 for the current television program (step 312). This indicator may be, for example,
2 any one or more of the title 290, the icon 292, or the "Go to Web Page" button 294
3 shown in Fig. 7. The procedure continues displaying the television program (and
4 any displayed indicators) on the display device (step 314). After a predetermined
5 time period, such as fifteen seconds, any displayed indicators are removed from
6 the display device (step 316). Removing any indicators after a particular time
7 period avoids creating a distraction to a viewer that is not interested in activating
8 an interactive mode or an online mode.

9 Fig. 10 is a flow diagram illustrating a procedure for handling a request to
10 enter an interactive mode for the current television program. An interactive
11 television device receives a viewer request to enter interactive mode for the
12 current television program (step 320). Next, the interactive television device
13 determines (e.g., from the decoded information contained in the television signal)
14 whether an interactive mode is available for the current television program (step
15 322). If an interactive mode is not available for the current television program,
16 then the interactive television device displays a message on the display device
17 indicating that an interactive mode is not available for the current television
18 program (step 324). The interactive television device continues displaying the
19 current television program in non-interactive mode (step 326). In an alternate
20 embodiment, the interactive television device ignores the viewer request to enter
21 an interactive mode.

22 If an interactive mode is available for the current television program, then
23 the interactive television device updates a channel table stored in the interactive
24 television device to indicate that the current channel is in an interactive mode (step
25 328). The interactive television device activates an interactive session for the

1 current television program (step 330). The network address or other information
2 identifying the source of the interactive data is decoded by the interactive
3 television device from the television signal received from the television broadcast
4 source. The interactive television device continues displaying the current
5 television program in interactive mode (step 332). A procedure similar to that
6 described with respect to Fig. 10 is used for handling a request to enter an online
7 mode for the current television program.

8 Fig. 11 illustrates a channel table that maintains various information
9 regarding different television channels, such as the interactive mode and online
10 mode status of one or more television channels. In a particular embodiment, the
11 channel table is stored in the interactive television device (e.g., using RAM 212 or
12 mass storage 216). Alternatively, the channel table may be stored in any device
13 that is accessible by the interactive television device. The channel table can be
14 stored locally (e.g., on a device coupled directly to the interactive television
15 device) or remotely (e.g., on a server or other device accessible via the Internet).
16 Although Fig. 10 shows a single channel table containing information relating to
17 both interactive modes and online modes, an alternate embodiment uses two
18 separate tables, one for interactive mode and another for online mode.

19 The channel table contains a first column 342 that indicates a particular
20 television channel. A column 344 indicates whether a television viewer has
21 activated an interactive mode for an associated channel. In the example of Fig. 11,
22 the viewer has activated an interactive mode for channels 2, 17, and 28. A column
23 346 indicates the time that the interactive mode was entered. For example, in Fig.
24 11, the interactive mode for channel 2 was activated at 12:24 and the interactive
25 mode for channel 28 was activated at 13:05 (1:05 p.m.). The time that the

1 interactive mode was entered is used by the interactive television device to
2 determine when to automatically deactivate the interactive mode for a particular
3 channel. For example, the interactive mode for a particular channel may be
4 deactivated after one hour or at the beginning of the next hour (e.g., 13:00, 14:00,
5 etc.).

6 A column 348 indicates whether a television viewer has activated an online
7 mode for an associated channel. In the example of Fig. 11, the viewer has
8 activated an online mode for channels 5 and 122. A column 350 indicates the time
9 that the online mode was entered for each channel in the online mode. A column
10 352 indicates an interactive address associated with each channel in the interactive
11 mode. A uniform resource locator (URL) or other address can be used to identify
12 the source or location of the interactive content. A column 354 indicates an online
13 uniform resource locator (URL) associated with each channel in the online mode.
14 The online television device uses the URL to retrieve the appropriate web page
15 when the viewer activates the online mode. For example, channel 5 may have an
16 associated online URL of "http://www.microsoft.com/events". The entries in the
17 channel table shown in Fig. 11 are changed as the viewer activates or deactivates
18 the interactive mode or the online mode associated with one or more channels.

19 Fig. 12 is a flow diagram illustrating a procedure for establishing the proper
20 interactive mode when changing television channels. An interactive television
21 device receives a viewer request to change channels (step 360). The interactive
22 television device tunes the requested channel (step 362) and checks the channel
23 table to determine whether the new channel is already in interactive mode (step
24 364). For example, using the channel table shown in Fig. 11, the interactive
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1 television device checks the entry in column 344 corresponding to the new
2 channel. If the new channel is not already in the interactive mode, the interactive
3 television device displays the television program associated with the new channel
4 on the display device in non-interactive mode (step 368). If the viewer later
5 activates an interactive mode for the new channel, then the channel table will be
6 updated to indicate that the new channel is in an interactive mode.

7 If the new channel is already in the interactive mode, the interactive
8 television device recreates the interactive session for the new channel (step 370).
9 Recreating the interactive session includes redisplaying the last page the viewer
10 was viewing before they changed channels. Recreating the interactive session
11 includes displaying an interactive window, such as interactive window 284 shown
12 in Fig. 6. As discussed above with respect to Fig. 2, the interactive television
13 device includes multiple tuners such that the interactive state of multiple channels
14 can be maintained simultaneously. Typically, a data tuner is less expensive than a
15 video tuner. An interactive television device can operate with a single video tuner
16 because a single video image is tuned at a given moment. The interactive
17 television device does not typically need to create two different images from two
18 different channels simultaneously. Furthermore, to maintain a connection with a
19 broadcast source (such as an interactive source) or an online web page, data tuning
20 is necessary, but video tuning is not required. Thus, a particular interactive
21 television device includes a single video tuner and multiple data tuners. Each
22 additional data tuner allows the interactive television device to maintain the
23 interactive state of another channel simultaneously. For example, if an interactive
24 television device contains one video tuner and ten data tuners, the device is able to
25 maintain the interactive state of eleven television channels simultaneously.

1 After reactivating the interactive session for the new channel, the
2 interactive television device then displays the television program associated with
3 the new channel in interactive mode (step 372). A procedure similar to that
4 illustrated in Fig. 12 is followed for establishing the proper online mode when
5 changing television channels.

6 The various information encoded in the broadcast signal regarding the
7 availability of an interactive mode and/or an online mode as well as other program
8 information may be contained in a template. For example, a template may include
9 a title field, a description field, an interactive mode field, an online mode field, and
10 any other fields necessary to describe the program or the various modes of
11 viewing the program. The template may also contain information indicating a
12 network address or URL necessary to allow the interactive television device to
13 communicate with the broadcast source or retrieve the appropriate web pages.
14 Additionally, the template may contain information about the type or types of
15 indicators that should be displayed to indicate the availability of an interactive or
16 online mode for a particular television program.

17 In one embodiment, information about the availability of interactive and/or
18 online modes as well as one or more mode indicators is broadcast as part of the
19 television signal using the Advanced Television Enhancement Forum (ATVEF)
20 specification version 1.1 (draft version) or any subsequent versions of the
21 specification.

22 Thus, a system has been described that maintains the interactive mode or
23 status on a channel-by-channel basis such that the viewer is not required to re-
24 activate the interactive mode for a channel that was previously activated.
25

Additionally, the described system provides a system that displays various indicators to notify the viewer that an interactive mode and/or an online mode is available

Although the invention has been described in language specific to structural features and/or methodological steps, it is to be understood that the invention defined in the appended claims is not necessarily limited to the specific features or steps described. Rather, the specific features and steps are disclosed as preferred forms of implementing the claimed invention.